

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, D.C. 20554

In the Matter of:	)	
	)	
	)	
Amendment of Parts 1, 21, 73, 74 and 101 of	)	WT Docket No. 03-66
the Commission's Rules to Facilitate the	)	RM-11614
Provision of Fixed and Mobile Broadband	)	
Access, Educational and Other Advanced	)	
Services in the 2150-2162 and 2500-2690	)	
MHz Bands	)	
	)	

**COMMENTS OF MOTOROLA MOBILITY, INC.**

Motorola Mobility, Inc. ("MMI") hereby responds to the Fourth Further Notice of Proposed Rulemaking ("*FNPRM*") in the above-referenced proceeding.<sup>1</sup> The *FNPRM* proposes to modify the out-of-band emission ("OOBE") limits for mobile Broadband Radio Service ("BRS") and Educational Broadband Service ("EBS") devices operating in the 2496-2690 MHz band ("2.5 GHz band")<sup>2</sup> in order to accommodate wider channel bandwidths in the 2.5 GHz band. As detailed below, MMI supports the proposed changes because they will advance key

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<sup>1</sup> *Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands*, Fourth Further Notice of Proposed Rulemaking, WT Docket No. 03-66, RM-11614 (May 27, 2011) ("*FNPRM*").

<sup>2</sup> The Commission's proposal comes from a Petition for Rulemaking filed in 2010 by the Wireless Communications Association International ("WCAI"). *See* Wireless Communications Association Int'l Petition to Amend Section 27.53(m) of the Commission's Rules, RM-11614 (filed Oct. 22, 2010) ("WCAI Petition"). Specifically, WCAI asks the Commission to revise Sections 27.53(m)(4) and 27.53(m)(6) to reduce the required OOBE attenuation factor from  $43 + 10 \log (P)$  dB to  $40 + 10 \log (P)$  dB at the channel edge. WCAI further proposes to set OOBE attenuation factors of  $43 + 10 \log (P)$  dB for frequencies more than 5 MHz beyond the channel edge and of  $55 + 10 \log (P)$  dB at frequencies that lie at the greater of 6 MHz beyond the channel edge or a width equal to the actual channel bandwidth from the channel edge. *Id.* at 2.

goals of the National Broadband Plan and better align the Commission’s rules with current and future 4G standards.<sup>3</sup> Specifically, the proposed changes will enable 2.5 GHz licensees to use spectrum more efficiently and to provide higher data rates to consumers. And these public interest benefits offset any potential increase in interference to existing users in the 2.5 GHz band and adjacent bands. For these reasons, the Commission should adopt its proposed OOB modifications.

**I. AMENDING THE OOB LIMITS FOR MOBILE STATIONS IN THE 2.5 GHz BAND IN ORDER TO ACCOMMODATE WIDER CHANNEL BANDWIDTHS WILL SPEED 4G WIRELESS BROADBAND DEPLOYMENT.**

MMI agrees with the National Broadband Plan’s proclamation that the 2.5 GHz band is critical to “providing a foundation for the nation’s 4G wireless networks.”<sup>4</sup> Unfortunately, and as detailed below, the existing OOB emission limits for mobile BRS and EBS stations—by effectively limiting the size of transmitting channels—prevent manufacturers and network operators from fully leveraging 4G network technologies in the 2.5 GHz band. Accordingly, MMI supports the proposed rule changes and agrees with WCAI that the proposal is “necessary to realize the full benefits of 4G technologies and better align the Commission’s rules with the approach of the global 3rd Generation Partnership Project applicable to the 2.5 GHz band.”<sup>5</sup>

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<sup>3</sup> MMI was created earlier this year when the former Motorola, Inc. separated into two independent, publicly traded companies. The former Motorola, Inc. supported WCAI’s petition during the Petition for Rulemaking comment cycle. *See* Motorola, Inc. Statement of Support of Petition for Rulemaking, RM-11614 (filed Dec. 6, 2010).

<sup>4</sup> *See* “Connecting America: The National Broadband Plan,” Federal Communications Commission, at 78 (2010) (“National Broadband Plan”).

<sup>5</sup> WCAI Petition at 2.

**A. Current OOB Limits for the 2.5 GHz Band Hinder 4G Deployment.**

MMI agrees with the Commission that the current OOB limits for the 2.5 GHz band will increasingly hamper 4G wireless broadband deployment by preventing 2.5 GHz licensees from transmitting over adequately-sized channels. As background, the Commission adopted the current OOB rules in 2004 based on the assumption that wireless operators would use 5.5 MHz channel widths in the 2.5 GHz band.<sup>6</sup> Although this assumption was reasonable in 2004, the 4G mobile broadband technologies that have been developed in recent years—LTE but also WiMAX<sup>7</sup>—are increasingly dependent on channels that are at least 10 MHz.<sup>8</sup> Already, manufacturers and network operators are finding it very difficult to manufacture and host BRS/EBS devices that meet the OOB limits for 10 MHz channels because of the design limitations with current technology. To create adequately-sized channels that operate within the current OOB limits, manufacturers are forced to construct devices that make compromises in device size, power consumption, heat dissipation, and other characteristics. This, in turn, increases manufacturing costs while simultaneously decreasing the attractiveness of 2.5 GHz devices for consumers.

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<sup>6</sup> See *Amendment of Parts 1, 21, 73, 74 and 101 of the Commission's Rules to Facilitate the Provision of Fixed and Mobile Broadband Access, Educational and Other Advanced Services in the 2150-2162 and 2500-2690 MHz Bands*, Report and Order and Further Notice of Proposed Rulemaking, 19 FCC Rcd 14165, ¶ 41 (2004) (*BRS/EBS R&O*) (explaining that the assignment of 5.5 megahertz-wide channels throughout the band “will enable licensees to deploy any possible combination of the most current FDD and TDD standard channel sizes, which are based on channelizing in 5 megahertz increments”).

<sup>7</sup> At present, the 2.5 GHz band is used by Clearwire Corporation and other operators to provide wireless broadband service using WiMAX. See Comments of Clearwire Corporation, RM-11614, at 1-2 (filed Dec. 6, 2010). The other major standard for wireless broadband technology is Long Term Evolution (“LTE”), which is developed by the Third Generation Partnership Project (“3GPP”). See <http://www.3gpp.org/-About-3GPP->.

<sup>8</sup> See WCAI Petition at 3; “LTE Benefits v. 3.3,” Verizon Wireless, at 3 (May 14, 2009), <https://www.lte.vzw.com/Portals/95/docs/LTE%20Benefits%20Guide.pdf>.

This problem will become more acute with the transition to the next generation of 4G technologies.<sup>9</sup> Indeed, the next incarnations of WiMAX and LTE—WiMAX-2 and LTE-Advanced—will support channel bandwidths that range from 20 to 100 megahertz in width.<sup>10</sup> At the same time, manufacturers expect that consumers will continue to demand small, highly mobile form factors. Marrying these two demands will prove very difficult with the existing OOB limits. WCAI recognizes the significant design issues, stating that “[d]esigning a smartphone with a small form factor using 20 MHz or wider channels that meets current OOB limits would be very difficult at best (and, at worst, impossible).”<sup>11</sup> It further notes that such a device would have an “artificially low battery life,” “could not easily dissipate the extra heat that would be generated by the additional filtering,” and “would result in coverage and capacity loss on the uplink.”<sup>12</sup> MMI concurs and adds that these problems will invariably limit the prospects for next generation wireless broadband in the 2.5 GHz band.

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<sup>9</sup> The Commission recognized as much in the National Broadband Plan: “[t]he progression to 4G technologies may require appropriately sized bands, including larger blocks to accommodate wider channel sizes.” *See* National Broadband Plan at 78. As WCAI explains, “[f]ollowing Shannon’s law, as channel bandwidth is increased, channel throughput generally increases linearly. In contrast, increasing carrier to interference-plus-noise ratio through frequency reuse generally yields only a logarithmic increase in capacity.” WCAI Petition at 3.

<sup>10</sup> *See* Report ITU-R M.2134, Requirements Related to Technical Performance for IMT-Advanced Radio Interface(s), at 5 Section 4.3 (IMT Advanced Technologies “shall support a scalable bandwidth up to and including 40 MHz,” and encouraging operation in bandwidths up to 100 megahertz). *See also* “ITU Paves Way for Next-Generation 4G Mobile Technologies; ITU IMT-R Advanced 4G Standards to Usher New Era of Mobile Broadband Communications,” *Press Release* (Oct. 21, 2010), [http://www.itu.int/net/pressoffice/press\\_releases/2010/40.aspx](http://www.itu.int/net/pressoffice/press_releases/2010/40.aspx) (designating LTE-Advanced and WiMAX2 as IMT-Advanced technologies).

<sup>11</sup> WCAI Petition at 5.

<sup>12</sup> *Id.*

**B. The Proposed Modifications Will Foster 4G Deployment by Enabling 2.5 GHz Licensees to Use Spectrum More Efficiently and by Aligning the 2.5 GHz OOB Limits with Applicable 4G International Standards.**

Modifying the 2.5 GHz OOB limits to accommodate larger channel widths is needed to promote broadband deployment in the 2.5 GHz band. As detailed above, 2.5 GHz licensees already find it very difficult to provide wireless broadband service over 10 MHz channels. Soon, the demands on available spectrum will become more pronounced,<sup>13</sup> and 2.5 GHz operators will require even wider channels to fully leverage 4G technologies. With these larger channels, 2.5 GHz operators will be able to increase spectral efficiency while simultaneously offering higher data rates. These advances will open the door to a much greater variety of broadband services and applications.

The proposed modifications to the OOB limits for the 2.5 GHz band would also align the Commission's rules with the applicable 3GPP standard. Such alignment will enable manufacturers and network operators to realize enormous economies of scope and scale in 2.5 GHz mobile devices. Conversely, lack of alignment will require products to be separately designed for use in the United States.<sup>14</sup> Alignment would drive down the cost of consumer equipment and foster increased adoption of 4G services and devices; however, customized equipment will increase manufacturing costs and consumer prices. As the Commission explains, "the opportunity to harmonize the Commission's rules with international standards could benefit

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<sup>13</sup> With the transition to 4G wireless broadband technologies, wireless broadband data use is projected to increase twenty-fold from 2009 to 2014. *See* National Broadband Plan at Exhibit 5-A p. 76.

<sup>14</sup> Adoption of OOB rules consistent with the 3GPP standard should provide the Commission with assurance that the OOB limits requested in WCAI's Petition are both necessary and will not cause harmful interference. As WCAI explains, the 3GPP is a "consensus-governed organization, bringing together a wide range of industry experts to develop globally applicable standards." WCAI Petition at 10.

both operators and consumers by encouraging the development of mobile broadband equipment for the 2.5 GHz band at lower cost.”<sup>15</sup>

## **II. THE BENEFITS OF THE PROPOSED OOBЕ MODIFICATIONS OUTWEIGH ANY INTERFERENCE CONCERNS.**

As detailed above, the next generation of 4G devices and applications will increasingly use channel bandwidths of larger size. In order to transmit over these larger channels, there will invariably need to be offsetting decreases in OOBЕ requirements, which may increase the *potential* for interference. In MMI’s view, however, the likelihood of interference *actually* occurring is very small because typical 4G system design specifications limit the bandwidth that is typically used at full power, which in turn limits OOBЕ.<sup>16</sup> As noted in the FNPRM, mobile 4G devices operate under very stringent power controls in order to maximize battery life and minimize intra-system interference.<sup>17</sup> In fact, LTE simulation studies conducted by 3GPP show that the average UE transmit power across all devices in a cellular mobile network is below 1 dBm and that 95 percent of all devices transmit with a power below 7 dBm,<sup>18</sup> which is a 16 dB margin to the maximum transmit power of 23 dBm. While MMI supports fully vetting interference concerns in the instant rulemaking, MMI expects that the Commission will conclude that any interference concerns are merely hypothetical.

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<sup>15</sup> FNPRM at ¶ 11.

<sup>16</sup> Mobile 4G devices use orthogonal frequency-division multiple access (“OFDMA”) technology. OFDMA technologies do not typically allocate all of the uplink bandwidth while operating at full transmit power—which is the scenario that would maximize potential interference.

<sup>17</sup> *Id.* at ¶ 7.

<sup>18</sup> See 3GPP TR 36.942, “Radio Frequency System Scenarios”, <http://www.3gpp.org/ftp/Specs/html-info/36942.htm>.

### III. CONCLUSION.

For the foregoing reasons, MMI urges the Commission to modify its OOB limits as proposed in the FNPRM.

Respectfully submitted,

/s/ Jason E. Friedrich

Jason E. Friedrich  
Head of U.S. Government and  
Regulatory Affairs  
Motorola Mobility, Inc.  
1455 Pennsylvania Avenue, NW  
Suite 900B  
Washington, DC 20004  
TEL: 202.371.6905

Dr. Alexander Gerdenitsch  
Radio Spectrum Engineer  
Motorola Mobility Inc.  
1455 Pennsylvania, N.W.  
Suite 900B  
Washington, DC 20004 USA  
TEL: 202 371 6908

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